DOCUMENT RESUME

ED 168 428 HE 011 133

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TITLE Effect of Curricula Choice on Attrition at Western Illinois University.
PUB DATE 29 Sep 78
NOTE 14p.; Paper presented at the Illinois Association for Institutional Research Annual Meeting (September 28-29, 1978)
AVAILABLE FROM Institutional Research and Planning Office, Western Illinois University, Macomb, IL

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Academic Achievement; *Attrition (Research Studies); *College Majors; *College Students; Courses; Discriminant Analysis; *Dropout Research; Higher Education; Institutional Research; Research Projects; *School Holding Power; Selection
IDENTIFIERS *Western Illinois University

ABSTRACT

The relationship between attrition and choice of major was studied at Western Illinois University. A secondary purpose was to determine whether measures of accademic ability, as well as curricular choice, will provide a basis for determining if attrition is likely to occur. Entering freshmen in the summer and fall terms of 1974, 1975, and 1976 were studied. Discriminant analysis procedures were used to predict attrition by combining college major and the following variables: high school percentile rank, ACT scores in English, math, natural science, social science, and ACT composite score. It was concluded that it is possible to improve prediction of attrition by combining measures of academic ability and achievement and major choice. It was found that information on initial achievement in college did not add materially to the ability to identify dropouts, while it did add to the ability to predict continuing students. The analysis seems to indicate that certain majors--in particular, business, information science, education, and public affairs--and services have a positive effect on retention of students. The study is being continued through the fall 1977 and 1978 classes. (SW)

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EFFECT OF CURRICULA CHOICE ON ATTRITION AT WESTERN ILLINOIS UNIVERSITY

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Presented
Illinois Association for Institutional Research
Annual Meeting
September 28-29, 1978

IR 011 133

EFFECT OF CURRICULA CHOICE ON ATTRITION AT
WESTERN ILLINOIS UNIVERSITY

Introduction

The 19 percent decline in the number of 18-year-olds in the 1980's has caused many colleges and universities to take a closer look at their enrolled students to determine if attrition can be reduced in order to offset anticipated enrollment declines.

Interest in attrition is not new; however, as a review of the literature will show, Summerskill, in a 1962 review of 35 studies conducted between 1913 and 1953, concluded that the percentage of students who leave college during the "normal" four-year college span remained about the same over the forty years studied. (5:627-657)

For every ten students who enter college in the 1970's, it is predicted that only four will graduate within four years. One of the six dropouts will complete his/her studies at the original institution sometime later, and two will eventually complete a degree at another college. Thus, three of the ten who entered will never obtain a degree.

If a college or university can decrease the estimated average of 30 percent attrition during the first year, 20 percent during the sophomore year and 10 percent during the last two years, the impact of enrollment declines on the institution's finances and other operations can be softened.

The best recent review of college attrition studies (1950-1975) can be found in the Winter 1978 issue of Review of Educational Research. (3:49-101) One of the criticisms of previous research on attrition has been that it tends to focus on only one or two academic factors and fails to compare dropouts with those who remain in school.

Another problem with attrition studies centers on the definitions of the terms "attrition" and "dropout." For example, attrition may be defined as the process whereby students permanently leave a specific college or university or leave higher education altogether. Dropouts may be defined as those students who have previously enrolled at the institution but who were not enrolled at the time of the study. The distinction between permanent and temporary dropouts may also be a part of the definition. Because of these varying definitions, comparisons of the results of various studies are often difficult or impossible.

Purpose

The major purpose of this paper is to explore the relationship between attrition and choice of major. A secondary purpose is to determine whether premeasures of academic ability, as well as curricular choice, will provide a basis for determining if attrition is likely to occur.

Procedures

The entering freshmen (summer and fall terms) of 1974, 1975 and 1976 were selected for study. Majors of the students were then combined into two-digit HEGIS categories to facilitate the investigation. Attrition was then analyzed by term (year one to year two, year two to three and three to four) as well as the overall attrition (year one to year four).

Results

Table 1 summarizes the percentage of new freshmen students in each HEGIS category who dropped out during the years 1974-75 through 1976-77. The highest attrition rate during the first year for 1974 freshmen was in HEGIS group 0700 (Computer and Information Sciences) with 40.00 percent leaving.

TABLE 1. PERCENT ATTRITION AFTER ONE YEAR BY HEGIS GROUPING FOR 1974-75 THROUGH 1976-77 FRESHMEN AT WIU

HEGIS Group	1974-75 Percent Attrition	1975-76 Percent Attrition	1976-77 Percent Attrition
0100	28.46	37.90	38.33
0400	33.33	29.25	33.67
0500	26.12	26.06	27.61
0600	26.19	37.50	27.66
0700	40.00	25.00	13.64
0800	27.53	25.82	31.35
0900	37.50	33.33	36.36
1000	33.11	32.34	40.83
1100	32.00	25.00	33.33
1200	30.38	29.33	32.89
1300	23.86	33.82	35.21
1500	35.29	30.56	21.74
1700	30.49	24.62	30.91
1900	35.71	36.36	29.27
2000	33.01	26.67	32.26
2100	33.12	21.24	29.39
2200	34.48	25.19	35.29
4900	27.03	-	-
Undecided	27.92	32.91	37.10
MEAN	29.24	29.12	32.48

It should be noted that this group had an N size of only 10. The second highest attrition rate was in HEGIS group 0900 (Engineering) with 37.50 percent leaving during the freshman year. The lowest attrition rate was in HEGIS group 1300 (Home Economics) with 23.86 percent leaving.

The 1975 freshmen had a mean attrition rate of 29.12 percent compared to 29 24 for the 1974 class. The attrition varied among the HEGIS groupings with Agriculture (0100) and Communications (0600) both having rates of over 37 percent. Public Affairs and Services (2100) was lowest, with 21.24 percent not returning one year later.

The freshman class of 1976 showed a mean attrition rate of 32.48 percent compared to 29.12 percent for the previous freshman class. The highest rate

was in Fine and Applied Arts (1000) with 40.83 percent not returning a year later, followed by Agriculture (0100) with 38.33 percent. At the other end of the scale was Computer and Information Sciences (0700) with only a 13.64 percent attrition rate. Thus, we find the attrition rates within some HEGIS groupings varying widely from year to year although the overall rate showed only minor changes from one year to the next.

Table 2 shows the percentage of the entering class by their classification after one, two or three years. After one year the average freshman class had 5.26 percent of its members still classified as freshmen, 63.93 percent as sophomores and 0.64 percent as juniors. Attrition averaged 30.17 percent of the classes after one year. After two years only 0.30 percent were still freshmen, 7.04 percent sophomores, 45.20 percent juniors and 1.81 percent seniors. An average of 45.65 percent of the entering classes of 1974 and 1975 had left the institution within two years.

Less than one percent of the 1974 entering freshmen were still freshmen or sophomores after three years. A total of 7.22 percent were classified as juniors and 39.35 percent were seniors. The attrition percentage increased from 45.65 percent after two years to 51.26 percent after three years.

The preliminary analysis of the three freshmen classes shows that major was related to attrition. While certain groups such as Fine Arts and Business have been uniformly higher or lower in terms of their attrition than the University as a whole, the overall picture is somewhat diffused.

To determine which students were most likely to drop out, other variables had to be considered. A major consideration in the selection of variables to be included in the analysis was the selection of those which were readily available before the students entered the University or shortly

TABLE 2. CLASSIFICATION OF ENTERING FRESHMEN AFTER ONE, TWO AND THREE YEARS

Class	1974 Freshmen	1975 Freshmen	1976 Freshmen	1974-1976 Freshmen One Yr. Avg.
Freshman	5.44	4.97	5.39	5.26
Sophomore	64.38	65.47	61.63	63.93
Junior	.94	.44	.50	.64
Senior	-	-	-	-
Dropout	29.24	29.12	32.48	30.17
TOTAL	100.00	100.00	100.00	100.00
N =	3,088	2,980	2,577	8,645

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	1974 Freshmen After 2 Years	1975 Freshmen After 2 Years	1974-1975 Two Yr. Avg.
Freshman	.36	.23	.30
Sophomore	7.19	6.88	7.04
Junior	45.66	44.73	45.20
Senior	2.10	1.51	1.81
Dropout	44.69	46.65	45.65
TOTAL	100.00	100.00	100.00
N =	3,088	2,980	6,069

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	1974 Freshmen After 3 Years
Freshman	.03
Sophomore	.75
Junior	7.22
Senior	39.35
Dropout	51.26
Graduate	1.39
TOTAL	100.00
N =	3,088

afterwards. There were seven variables selected: high school percentile rank, ACT scores in English, Math, Natural Science, Social Science, ACT composite score, and major. To facilitate the analysis the various majors were combined into a two-digit HEGIS code. In addition, nineteen interaction vectors were generated between discipline and ACT score. The criteria was whether the student was enrolled in the fall term of the second year or not. If the student was not enrolled he was classified as a member of Group 1, dropouts; and if enrolled, a member of Group 0, continuing.

TABLE 3. STANDARDIZED DISCRIMINANT FUNCTION COEFFICIENTS

Variables	1974	1975*	1976	1975-1976	1974-1976
High School Rank	.450	.726	.592	.682	.712
ACT Composite Score	.408	.410		.455	.352
ACT Math	.360				.068
ACT English			.321		
ACT Natural Science			.266		.106
Agriculture		-.177		-.171	-.021
Biological Sciences	-.107				
Business	.230	.179	.379	.247	.324
Communications	.121		.379		.089
Information Science			.190	.096	.085
Education	.216	.292	.155	.219	.266
Industrial Technology					.027
Fine Arts			-.106	-.090	
Natural Sciences	-.111	-.111			-.032
Psychology		.105			.075
Public Affairs & Service		.289	.254	.234	.241
Social Science		.109			.068
Interdisciplinary Studies					-.055
Unclassified	.281				.211
Sex		-.192		-.106	
Centroid					
Continuing	.125	.135	.139	.122	.125
Dropout	-.290	-.328	-.290	-.287	-.283

*Signs on coefficients and centroids reversed to facilitate comparing.

A statistical procedure known as discriminant analysis was then employed. This statistical procedure is utilized when the concern of the investigator is

to distinguish between two or more groups and to tell him to which group each member probably belongs. As a result of this analysis a series of discriminant functions were developed for each year to determine whether the independent variables actually distinguished between those who continued and those who dropped out. The results of the discriminant analyses for five different time periods are summarized in Table 3. When the sign is ignored these coefficients represent the relative contribution of each variables. The sign indicates whether the variable is a positive or negative contribution to the function. As can be seen from Table 3, measures of academic achievement such as high school rank and ACT composite scores are the most important variables, whether we are looking at individual years or combination of years. Various disciplines also appear to be major contributors with the most stable of these Business Education and Public Affairs and Services. These various discriminant functions indicate that major choice is definitely a factor in predicting attrition. Appendix A shows the same information except it utilizes unstandardized coefficients. These can be multiplied against the raw scores of each variable to arrive at a given discriminant score. It should be pointed out that these variables do not represent the relative importance of each variable in the analyses since they have not been adjusted for the difference in measurement scales and variations within the independent variables.

The effectiveness of the discriminant functions to correctly predict outcome are shown in Table 4. Utilizing only the independent variables of sex, high school percentile rank, ACT scores and major, the overall effectiveness of the five analyses ranged from 58.5 percent to 59.8 percent. The effectiveness in the prediction of continuing students as well as dropouts was approximately the same. The secondary analysis was then made using the same variables as

TABLE 4. PERCENT CORRECT CLASSIFICATION WITHOUT KNOWLEDGE OF FALL TERM GPA, FRESHMAN CLASSES OF 1974-76

Class	Continuing	Dropout	Percent Overall Correct
1974	59.1	57.3	58.5
1975	59.3	59.1	59.3
1976	60.0	59.4	59.8
1975 & 1976	58.3	59.3	58.6
1974, 1975 & 1976	58.1	59.1	58.4

before with the addition of first term grade point average. The results of this analysis appear in Table 5. The ability to predict who would continue increased markedly from an average of 58.1 to 67.4 percent. However, the ability to correctly predict who would drop out, with the exception of 1975, did not improve substantially. This seems to indicate that the premeasure of academic achievement, high school percentile rank, and ACT score are as useful as initial grade point averages in predicting who will drop out. As the initial concern was an attempt to identify potential attrition as early as possible, the discriminant model utilized included premeasures of academic success only.

TABLE 5. PERCENT CORRECT CLASSIFICATION WITH KNOWLEDGE OF FALL TERM GPA, FRESHMAN CLASSES OF 1974-76

Class	Continuing	Dropout	Percent Overall Correct
1974	65.8	58.0	63.5
1975	69.2	63.0	67.4
1976	67.3	59.1	64.3
1975 & 1976	68.8	59.7	66.1
1974, 1975 & 1976	67.4	60.0	65.2

The major finding of this analysis is that it is possible to improve prediction of attrition by combining premeasures of academic ability and achievement and major choice. One unexpected outcome was the discovery that information on initial achievement in college did not add materially to the ability to

identify dropouts (Tables 4 and 5) while it did add to the ability to predict continuing students.

The analysis seems to indicate that certain majors, in particular, Business, Information Science, Education and Public Affairs and Services have a positive effect on retention of students.

This study is being continued with the weights derived from the 1975 and 1976 analyses being applied to the Fall 1977 and the Fall 1978 classes to determine how effective they are in predicting attrition (see Appendix B for classification function coefficients). In addition, further analysis is being done by separating those students who leave into two groups--those who may transfer and those who are unlikely to transfer. The criteria of cumulative grade point average is being used to separate the two groups.

APPENDIX A

UNSTANDARDIZED DISCRIMINANT FUNCTION COEFFICIENTS

Variables	1974	1975*	1976	1975-1976	1974-1976
High School Rank	2.185	-3.257	2.644	3.047	3.252
ACT Composite Score	.092	-.090		.098	.076
ACT Math	.057				.010
ACT English			.072		
ACT Natural Science			.048		.020
Agriculture		.883		-.835	-.103
Biological Sciences	-.491				
Business	,585	-.450	.906	.604	.804
Communications	1.075		1.027		.661
Information Science			2.054	1.165	1.117
Education	.610	-.857	.470	.653	.780
Industrial Technology					.214
Fine Arts			-.499	-.405	
Natural Sciences	-1.052	.922			-.272
Psychology		-.666			.455
Public Affairs & Services		-1.176	.895	.894	.959
Social Science		-.523			.324
Interdisciplinary Studies					-.781
Unclassified	.659				.504
Sex		.384		-.211	
Centroid					
Continuing	.125	-.135	.139	.122	.125
Dropout	-.290	.328	-.290	-.287	-.283
Constant	-4.703	3.499	-4.332	-3.695	4.628

*Signs on coefficients and centroids reversed to facilitate comparing.

APPENDIX B

CLASSIFICATION FUNCTION COEFFICIENTS

Variable	GROUP 0 Continuing	GROUP 1 Dropout
H.S.R.	1.97	.684
ACT Composite	1.05	1.01
Agriculture	3.30	3.66
Business	2.92	2.66
Information Science	2.02	1.52
Education	1.68	1.40
Fine Arts	.72	.89
Public Affairs & Service	4.37	3.99
Sex	7.78	7.87
Constant	-17.68	-16.15

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